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10/716,797	11/18/2003	Isaac N. Bankman	1374-SPL C	6782

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EXAMINER	
TABATABAI, ABOLFAZL	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/716,797	BANKMAN ET AL.	
	Examiner	Art Unit	
	Abolfazl Tabatabai	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *August 5, 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-23* is/are rejected.

7)☒ Claim(s) *4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 22 and 23 are directed to non-statutory subject matter. Because " A computer program " alone has no set definition. The following claim formats are acceptable and not subject to 101 rejection " A computer program embodied in a computer readable medium for performing the steps of ..." and " A computer readable medium storing a program for performing the steps of...". See MPEP 2106.

Response to Amendment/Arguments

3. Applicant's arguments, (pages8-10), filed on August 5, 2005 with respect to the rejection(s) of claim(s) 1-3, 5-13,16 and under Dewaele et al (U S 5,651,062) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Dewaele et al (U S 5,651,062); Kuhn (U S 5,892,916); Bamberger et al (U S 5,854,851) and Weiss et al (5,740,266).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 5-13,16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dewaele (U S 5,651,042) in view of Kuhn et al (U S 5,982,916).

Regarding claim 1, Dewaele discloses a method for segmenting a small feature in a multidimensional digital array of intensity values in a data processor, the method comprising:

computing an edge metric along each ray of a plurality of multidimensional rays originating at a local intensity extreme {According to Dewaele " the orientation [0(i,j)], of the locus of edge-points in the edge-image [E(i,j)], is calculated in three stages: Edge thinning, connectivity, analysis and regression"(See column 9, lines 7-9 and column 10, lines 29-34)}

identifying a multidimensional edge point corresponding to a maximum edge metric on each said ray [According to Dewaele " X-ray image is used in the meaning of a two-dimensional digital image representation as an array of numbers, the magnitudes of which are related to the intensity of the X-ray arriving at a two-dimensional physical detector such as photostimulabel phosphor screen" (column 5, lines 28-33)]. However, Dewaele is silent about the specific details regarding the steps of:

labeling every point on each said ray from said local extreme to said edge point; and,

labeling an unlabeled point if the unlabeled point is adjacent to a labeled point and the unlabeled point has a more extreme intensity than the labeled point and the unlabeled point is closer than the labeled point to the local extreme.

In the same field of endeavor (medical imaging), however, Kuhn discloses a method and apparatus for automatically locating a region of interest in radiograph comprising the steps of:

labeling every point on each said ray from said local extreme to said edge point (column 10, lines 9-17 and 42-51); and,

labeling an unlabeled point if the unlabeled point is adjacent to a labeled point and the unlabeled point has a more extreme intensity than the labeled point and the unlabeled point is closer than the labeled point to the local extreme (column 10, lines 9-17 and 42-51).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use labeling point as taught by Kuhn in the system of Dewaele because Kuhn provides Dewaele an improved system for automatically locating a desired region of interesting a digitized mammogram with a plurality of pixel intensity, like forming a histogram using the image intensity data, wherein one axis of the histogram indicates increasing image intensity value and an orthogonal axis of the histogram indicates increasing image pixel count. Also a potential advantage of digital radiography is the capability for quantitative analysis of image data representing normal and abnormal patterns and subsequent use of this data to aid radiologists diagnosis.

Regarding claim 2, Dewaele discloses the method of claim 1 wherein intensity is a vector of values and an edge metric is a magnitude of a vector difference in intensities between two points along each said ray divided by a multidimensional distance between the same two points (column 8, lines 26-27).

Regarding claim 3, Dewaele is silent about the specific details regarding the method of claim 1, further comprising additionally labeling an unlabeled point if the unlabeled point is adjacent to a labeled point and has a more extreme intensity than the labeled point and is no farther from the local extreme than the sum of a distance from the labeled point to the local extreme plus an expansive tolerance distance less than the spacing between adjacent points.

In the same field of endeavor (medical imaging), however, Kuhn discloses a method and apparatus for automatically locating a region of interest in radiograph comprises additionally labeling an unlabeled point if the unlabeled point is adjacent to a labeled point and has a more extreme intensity than the labeled point and is no farther from the local extreme than the sum of a distance from the labeled point to the local extreme plus an expansive tolerance distance less than the spacing between adjacent points (column 10, lines 9-17 and 42-51).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use additionally labeling an unlabeled point if the unlabeled point is adjacent to a labeled point as taught by Kuhn in the system of Dewaele because Kuhn provides Dewaele an improved system for automatically locating a desired region of interesting a digitized mammogram with a plurality of pixel intensity, like forming a histogram using the image intensity data, wherein one axis of the histogram indicates increasing image intensity value and an orthogonal axis of the histogram indicates increasing image pixel count. Also a potential advantage of digital radiography is the

capability for quantitative analysis of image data representing normal and abnormal patterns and subsequent use of this data to aid radiologists diagnosis.

Claim 5 is similarly analyzed as claim 3 above.

Regarding claim 6, Dewaele discloses the method of claim 5, wherein the inclusion tolerance distance is about a spacing distance between adjacent points in the array or more (column 11, lines 26-30).

Claim 7 is similarly analyzed as claim 1 above.

Regarding claim 8, Dewaele discloses the method of claim 1, wherein a ray length of each said ray is scaled by an expected size of a small feature (column 11, lines 2-14).

Regarding claim 9, Dewaele discloses the method of claim 1, wherein the local intensity extreme is a point with the maximum intensity among a subarray of the multidimensional digital array of intensity values, the subarray having a certain multidimensional size (column 5, lines 53-63) and

the intensity of the local intensity extreme exceeds a bright threshold intensity (column 11, lines 2-11).

Claim 10 is similarly analyzed as claim 8 above.

Claim 11 is similarly analyzed as claim 9 above.

Claim 12 is similarly analyzed as claim 8 above.

Regarding claim 13, the method of claim 1, wherein the multidimensional array is a digital image, and each point is a pixel (Column 5, lines 58-43).

Claim 16 is similarly analyzed as claim 1 above.

Claim 17 is similarly analyzed as claim 1 above.

6. Claims 14 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dewaele (U S 5,651,042) and Kuhn et al (U S 5,982,916) as applied to claim 1, and above in further in view of Bamberger et al (U S 5,854,851).

Regarding claim 14, Dewaele is silent about the specific details regarding the method of claim 13, wherein the digital image is a digitized mammogram and the small feature is a microcalcification candidate.

In the same field of endeavor (medical image), however, Bamberger discloses a system for diagnosis of living tissue diseases using digital image processing comprising the digital image is a digitized mammogram and the small feature is a microcalcification candidate (column 14, lines 36-46).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a digitized mammogram and the small feature is a micro-calcification as taught by Bamberger in the system of Dewaele because Bamberger provides Dewaele an improved system which is designated to support radiologists analyses by characterizing equivocal and suspicious finding detected on routine mammograms, so as to improve visualization of suspected finding and to quantify the mammographic features of suspected lesions.

Regarding claim 19, Dewaele discloses a data processing apparatus for segmenting a small feature in a multidimensional digital array of intensity values comprising:

an input for a plurality of intensity values arranged along regular increments in each of a plurality of dimensions (column 5, lines 58-63)

an output for providing the labeled points for subsequent processing (column 5, lines 46-49)

However, Dewaele is silent about the specific details regarding the steps of:

a memory medium for storing the plurality of intensity values as a multidimensional digital array;

a processor configured to detect a local intensity extreme in the multidimensional digital array, to identify points along a plurality of rays originating at the local intensity extreme, to identify one edge point on each ray of said plurality of rays, said edge point associated with a maximum edge metric along said ray, to label each point on each ray from the local intensity extreme to the edge point, and to label an unlabeled point adjacent to a labeled point if the unlabeled point has a more extreme intensity than the labeled point and the unlabeled point is closer than the labeled point to the local extreme until no more unlabeled points can be labeled.

In the same field of endeavor (medical image), however, Bamberger discloses a system for diagnosis of living tissue diseases using digital image processing comprising the steps of:

a memory medium for storing the plurality of intensity values as a multidimensional digital array (fig. 1, element 18)

a processor configured to detect a local intensity extreme in the multidimensional digital array, to identify points along a plurality of rays originating at the local intensity

extreme, to identify one edge point on each ray of said plurality of rays, said edge point associated with a maximum edge metric along said ray, to label each point on each ray from the local intensity extreme to the edge point, and to label an unlabeled point adjacent to a labeled point if the unlabeled point has a more extreme intensity than the labeled point and the unlabeled point is closer than the labeled point to the local extreme until no more unlabeled points can be labeled(fig. 1 element 20, and column 22, lines 5-20).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use processor and memory as taught by Bamberger in the system of Dewaele because Bamberger provides Dewaele an improved advanced system which performs calculations and logic operation to execute programs and memory media will contain the program information for controlling to enable the computer to perform its functions.

Regarding claim 20, Dewaele discloses the apparatus of claim 19, wherein the plurality of intensity values arranged along regular increments in each of a plurality of dimensions is at least one digital image, and each point is a pixel (column 5, lines 58-63).

Claim 21 is similarly analyzed as claim 14 above.

Claim 22 is similarly analyzed as claim 19 above.

Regarding claim 23, Dewaele discloses an apparatus for segmenting a small feature in a multidimensional array of intensities comprising:

computing an edge metric along each ray of a plurality of multidimensional rays originating at a local intensity extreme (column 5, lines 58-63) identify a multidimensional edge point corresponding to a maximum edge metric on each said ray (Column 9, lines 7-9 and column 10, lines 29-34) to label every point on each said ray from said local extreme, to said edge point, and to label an unlabeled point if the unlabeled point is adjacent to a labeled point and the unlabeled point has a more extreme intensity than the labeled point and the unlabeled is closer than the labeled point to the local extreme (Column 10, lines 29-34).

However, is silent about the soecific details regarding the steps of:

electronic signals transmitted over at least one communication line; and,

computer controlling instructions, transmitted via the electronic signals.

In the same field of endeavor (medical image), however, Bamberger discloses a system for diagnosis of living tissue diseases using digital image processing comprising the steps of:

electronic signals transmitted over at least one communication line (Column 4, lines 7-15 and lines 49-53); and,

computer controlling instructions, transmitted via the electronic signals (fig. 1 element 18).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use electronic signals transmitted over at least one communication line and a computer controlling instruction as taught by Bamberger in the system of Dewaele because Bamberger provides Dewaele an improved advanced

system which performs calculations and logic operation to execute programs and memory media will contain the program information for controlling to enable the computer to perform its functions.

7. Claims 15, and 18, are rejected under 35 U.S.C. 103(a) as being unpatentable over Dewaele (U S 5,651,042) and Bamberger et al (U S 5,854,851) as applied to claim 1 and further in view of Weiss et al (U S 5,740,266).

Regarding claim 15, Dewaele and Bamberger are silent about the specific details regarding the method of claim 13, wherein the digital image is a video frame of a military scene and the small feature is a candidate target of a firing system.

In the same field of endeavor (medical image), however, Weiss discloses an image processing system comprising the digital image is a video frame of a military scene and the small feature is a candidate target of a firing system (fig. 1 and column 6, lines 65-67).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use military scene and target of a firing system as taught by Weiss in the system of Dewaele because Weiss provides an improved system to remove clutter by filtering using a band pass filter to emphasis the target object and suppress clutter. Also this system evaluates the shape of an outline formed by image processing by determination of the curvature of the shape.

Regarding claim 18, Dewaele and Bamberger are silent about the specific details regarding the method of claim 17, further comprising joining a plurality of small features into a composite feature when a feature edge point from one small feature of the

plurality of small features is within a join distance of a feature edge point of another small feature of the plurality of small features.

In the same field of endeavor (medical image), however, Weiss discloses an image processing system comprising joining a plurality of small features into a composite feature when a feature edge point from one small feature of the plurality of small features is within a join distance of a feature edge point of another small feature of the plurality of small features (column 4, lines 49-56 of Weiss et al).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use composite features as taught by Weiss in the system of Dewaele because Weiss provides an improved system to remove clutter by filtering using a band pass filter to emphasis the target object and suppress clutter. Also this system evaluates the shape of an outline formed by image processing by determination of the curvature of the shape.

Allowable Subject Matter

8. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Other prior art cited

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U. S. Patent (U S 5,506,913) to Ibison et al is cited for a method of recognizing an

irradiation field.

U.S. Patent (U S 5,365,429) to Garman et al is cited for computer detection for microcalcifications in mammograms.

U. S. Patent (U S 6,249,594) to Hibbard Bloomfield is cited for auto segmentation /auto contouring system and method.

U. S. Patent (U S 6,535,623 B1) to Tannenbaum et al is cited for curvature based system for the segmentation and analysis of cardiac magnetic resonance images.

Contact Information

4. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to ABOLFAZL TABATABAI whose telephone number is (571) 272-7458.
The Examiner can normally be reached on Monday through Friday from 9:30 a.m. to 7:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Jingge Wu, can be reached at (571) 272-7429. The fax phone number for organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Abolfazl Tabatabai

Patent Examiner

Group Art Unit 2625

October 27, 2005

A-Tabatabai